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New Product Concept Identification Form

| | | | |
|-------------------|--|---|------------|
| ORIGINATOR | <u>New Product Name:</u> Load Lock Vacuum Sensor (LLVS) | <u>Time Spent Reviewing Concept:</u> Sixteen Hours | Project #: |
| | <u>First Person at MKS to Identify Concept:</u> Name: Jim Stafford | | |
| | <u>First Person in Marketplace to Identify Concept:</u> VRC introduced a combined Pirani sensor and diaphragm sensor to provide a single output from 1 mTorr to 1500 Torr. This sensor will provide the low pressure measurement for base pressure of the load lock as well as the pressure indication for cross over and vent stages of the load lock. Please refer to MKS article in Oct 1997 issue of Solid State Technology for information on this application. Name: VRC ,Varian and Teledyne Hastings | | |
| | <u>Describe How Concept was Identified:</u> Concept was identified by customer visits, review of literature and competitive analysis. The combination of the diaphragm gauge eliminates many of the disadvantages of using a convection type sensor. This sensor improves response time, accuracy and eliminates gas dependence while at the same time allowing rough measurements required for base pressure measurements. | | |
| | <u>Who Else is Aware of this Concept?</u> This concept has been "tossed" around for several years. However, a target market has never been identified. The next expansion in the semiconductor industry will be looking for unique products to reduce cost and increase performance. This new sensor has the potential for achieving both. | | |
| | <u>Product Description:</u> The product that would fit the semiconductor industry would be a transducer type gauge providing a single logarithmic analog output from 1 mTorr to 1500 Torr. A digital version would also be very desirable. The additional cost of the digital electronics (as a % of the sensor cost) would be much less than for a conventional convection sensor cover the same pressure range. In addition, there would be the added advantage of reduce cabling and the number of ports for the user. | | |
| | <u>Time/Window of Product to Market:</u> The completion of the initial 300mm tools for development fabs has reduce the urgency for this product. The real opportunity will be in the cost reduction measures that will be taken by the tool manufacturers as these tools go into production | | |
| | <u>Summary:</u> The semiconductor industry is currently designing tools to produce products for the 21st century. Our customers are looking for solutions to specific problems on their equipment. This "new" sensor solves many of the problems that customers have been enduring for the last 10 years. These problems will only get worse as the chamber sizes increase. | | |

New Product Concept Identification Form (Cont.)

| CLASSIFICATION | | | | |
|---|--|---|---|---------------------------------------|
| Division PCIG <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> HPS <input checked="" type="checkbox"/> UTI <input type="checkbox"/> Germany <input type="checkbox"/> Japan <input type="checkbox"/> Korea <input type="checkbox"/> | Market Region N. America <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Asia <input checked="" type="checkbox"/> Other <input type="checkbox"/> | Market Window Tight <input type="checkbox"/> Open <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> <input type="checkbox"/> | Technical Difficulty High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> | |
| | | | | |
| | | | | |
| | | | | |
| | Market Place Large <input type="checkbox"/> Moderate <input checked="" type="checkbox"/> Established <input type="checkbox"/> Customer Request <input type="checkbox"/> | Manufacturing Resources Existing Production Line <input type="checkbox"/> Expansion Required <input checked="" type="checkbox"/> New Line Required <input type="checkbox"/> | | |
| | | | | |
| | | | | |
| | | | | |
| ACTION TO TAKE | | | REASON | |
| Hold <input type="checkbox"/> Need Cust. Input to Proceed <input type="checkbox"/> Need MKS Input to Proceed <input type="checkbox"/> Begin Regular DEF Proposal <input type="checkbox"/> Begin Expedited DEF Proposal <input type="checkbox"/> | | | | |
| | | | | |
| Marketing: Date: | | Product Mgr: Date: | | Product Selection Committee: Date: |
| President: Date: | | Controller: Date: | | Exec. VP Technology: Date: |
| VP Pressure Group: Date: | | VP PCIG: Date: | | |

MKS CONFIDENTIAL

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Operation: MKS
Vacuum Products

Product Concept: Load Lock Vacuum Sensor

SUBMITTED BY:

Date Submitted: ___/___/___

MKS CONFIDENTIAL

Idea came from:

on date:

Jim Stafford

11/2/87

Concept Approved for Product Definition
Operations Manager and Date: _____

Development Proposal Due: _____

Account Number: _____

PRODUCT CONCEPT

Definition Proposal

Business Opportunity

Product Description The sensor would provide a single analog or digital output from 1×10^{-4} to 1000 Torr. The low vacuum range (10-1000 Torr) would be gas independent.

- | Product Type |
|--|
| <input checked="" type="checkbox"/> Evolutionary |
| <input type="checkbox"/> Incremental |
| <input type="checkbox"/> Next Generation |

Target Market/Customers Semiconductor OEM manufacturers.
Load Locks, transfer chambers, and exit chambers.

- | Market Growth |
|---------------------------------|
| <input type="checkbox"/> Fast |
| <input type="checkbox"/> Normal |
| <input type="checkbox"/> Slow |

Key Market Needs including Customer's Stated Requirements, Expected Price, and Applications

Customers needs outlined in MKS article in SST Oct. 1997 issue "Pressure Measurement and Control in Load Locks".
Three functions

Existing Competitive Product and Sales Price

Varian

\$525.00 sensor only

List Price \$ 750

Expected Discount \$ 12 15 %

Expected Average Selling Price \$ 637 100 %

Material & Labor Cost \$ 150 23 %

Cost of Selling (5% ASP) \$ 32 5 %

Direct Margin \$ 455 70 %

Expected Competitive Product

Teledyne Hastings - solid state sensor
Balzers

Market Window We Must Hit and Why

The next window is cost reduction on 300mm which may be 1 to 2 yrs.

Annual Market Size at Maturity

Market 1 \$3 million

Markets

Semiconductor Equipment

Market Size

5 million

Share %

60%

Revenue

\$18 m

Market 2 \$1 million

Analytical Equipment

Market Size

2 million

Share %

50%

Revenue

\$900k

Market 3

Total

Effect on Other MKS Products. (Increase or decrease in units and dollars)

Decrease pressure switch and CEP sales
2 Pressure switches - 370×2 } 1070
1 CEP 330 }

Summary... Why should we develop this product? (Develop new market, protect existing market, etc...)

Protect existing market.

Higher margin product because eliminating multiple sensors

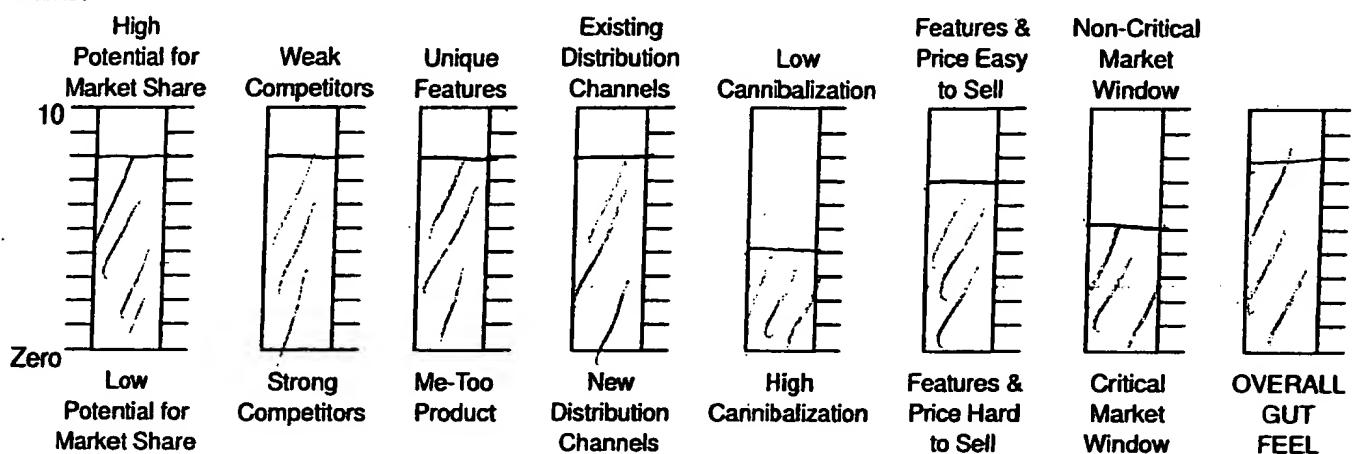
| Definition Proposal | PRODUCT CONCEPT: | Product Description |
|---|---|--|
| Critical Specifications (Examples are accuracy, materials, size, cost, essential features) | | |
| Specifications dictated by needs to control pumpdown and vent cycles. Door lock door activation Soft pump switch Crossover (transfer chamber) or process chamber | accuracy 15% gas independent (N ₂ , He, Ar) 760 torr accuracy 10% 10 Torr accuracy 50% 1x10 ⁻³ Torr | |
| How the Product Will Change the Existing Product Line | | <p>This depends very much on how the product is designed.</p> <p>If the product is designed using specs above it would complement existing lines. Tradeoff: accuracy vs convenience.</p> |
| How the Product Differs from MKS and Competitive Alternatives | | Product would differ in that it would bring MKS Baratron technology to the table along with its marketing power. |
| Expected Reuse from Prior Products | yes, use existing Baratron and Pirani technology | |
| New Manufacturing Processes and Materials Required | Potentially require die attach and wirebonder. | |
| Inventions and Patents (Preliminary) | none | |
| Safety, Regulatory, and Environmental Issues | CE mark | |

Definition Proposal

PRODUCT CONCEPT:

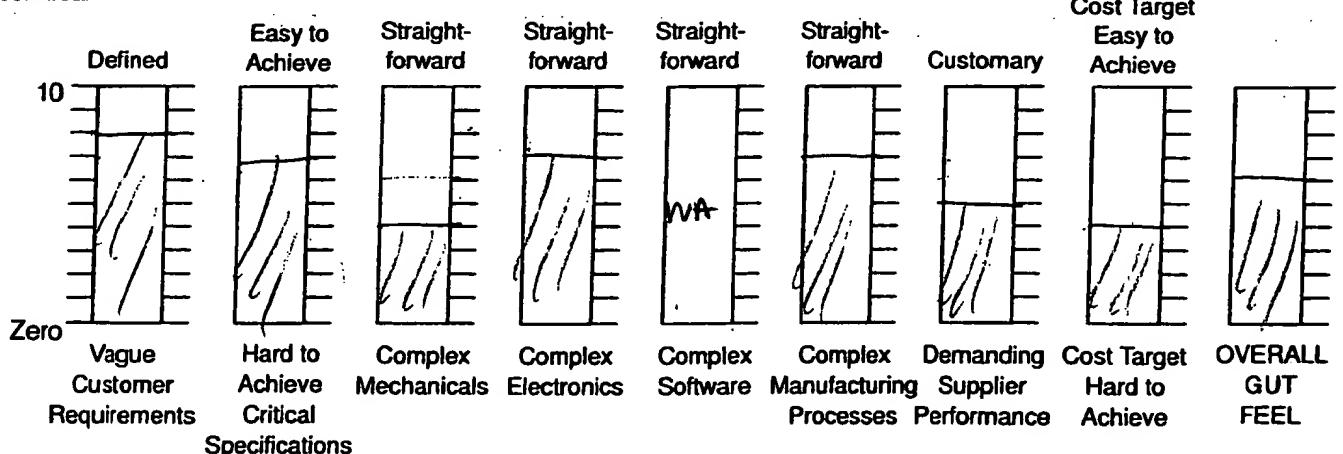
Risk Analysis

Market



Market Risk Summary The risk is that a competitor will come to market that may eliminate the need for several separate "dumb" switches and a proxy sensor. This is especially true due to the digitization of the sensors.

Technical



Technical Risk Summary

Risks are

- 1) over speeding sensor for application
- 2) keeping packaging costs down

PRODUCT CONCEPT

Definition Proposal

Resources

Progress-to-Date (Technology, specifications, market research, etc...)

There is a general trend to combine sensor technologies to achieve broader range pressure measurement.

In addition adding digital capability to combined sensors will certainly provide cost advantages to users. This eliminates the need to have essentially the same digital components stuck on several sensors.

Obstacles Needing to be Cleared

Determination of technologies/packaging used to meet cost goals.

Definition Phase Team

| <u>Function</u> | <u>Name</u> | <u>Weeks Req'd</u> |
|---------------------------|-------------|--------------------|
| Team Leader | _____ | _____ |
| Marketing | _____ | _____ |
| Product Management | _____ | _____ |
| Electrical Engineering | _____ | _____ |
| Mechanical Engineering | _____ | _____ |
| Software Engineering | _____ | _____ |
| Applications Engineering | _____ | _____ |
| Manufacturing Engineering | _____ | _____ |
| Test Engineering | _____ | _____ |
| Purchasing | _____ | _____ |
| Other: _____ | _____ | _____ |
| Other: _____ | _____ | _____ |
| Other: _____ | _____ | _____ |

Total Weeks of Effort Required to Complete the Definition Phase: _____

Duration of Definition Phase: _____ Months

Other Needs